

ANTI-TYPHOID INOCULATION IN THE CANADIAN ARMY.

By GEORGE D. PORTER, M.B., CAPT. C.A.M.C.,

TORONTO, CANADA.

We have only to review the death rates from typhoid fever in recent wars to appreciate how important a factor this disease has been in modern warfare. Typhoid fever caused 8,000 deaths in the South African War, while there were only 7,700 British soldiers killed in battle. During the Spanish-American War 3,000 men died of typhoid, while there have been only 9 deaths from this disease in the army camps in the United States since September 21, 1917. In fact, the sick and death rates from this disease are so small here as to be considered negligible. This also holds true for Canada.

This wonderful improvement must in large part be attributed to compulsory inoculation against typhoid, while the improved sanitation and pure water supply materially assist in this result.

Inoculation against typhoid is compulsory in the Canadian Army and the recognition of its importance is shown by a recent order placing parades for inoculation before purely military ones. It is pointed out that "Any slight interruption in military training necessary from time to time is more than compensated for by the protection afforded by inoculation against typhoid."

While the figures given out from the front regarding the prevalence of typhoid are not readily obtainable, yet those already received are conclusive as to the great protective value of inoculation and they also prove its value in the lessened mortality amongst those who have contracted typhoid.

(In the Gallipoli Campaign the large number of cases which developed there were paratyphoid, against which there had been no inoculation. For the past two years, however, a combination of paratyphoid and typhoid vaccine has been used.)

The Research Defence Society of England issued a leaflet on the protection against typhoid afforded by inoculation, dated January, 1915, in which it reported as follows: "Among the Expeditionary Force in France and Belgium about 95 per cent. have been inoculated against typhoid fever, the annual average being about 90 per cent.

"The annual admission ratio per 1,000 is more than nine times greater among non-protected than among the protected and the death rate is thirty-one times greater among the non-protected."

An official British report states that from August, 1914, to November 10, 1915, 1,365 cases of typhoid were reported among the British troops on France and Belgium (1,150 verified by laboratory diagnosis). In 570 cases amongst the inoculated there were 35 deaths, while in 571 cases amongst those unprotected by inoculation, there were 115 deaths. Owing to our lack of information regarding the number of inoculated soldiers who contracted typhoid, and those not inoculated who contracted the disease, it is impossible to compare the results, but these figures do show that the mortality is two thirds less among those inoculated. Another list of figures taken from the report of Dr. Jules Courtmont, of France, shows that in 1,347 cases of typhoid 891 had not been inoculated, while 225 had. Of the 891 cases uninoculated there were 155 deaths, making 17.4 per cent. Of the 256 cases inoculated there were only eight deaths, making 3.1 per cent. The mortality amongst those inoculated only once was greater than amongst those inoculated twice, and the mortality amongst those inoculated twice was greater than amongst those inoculated three times.

The technic used at the Laboratory in Military District No. 2, Toronto, is to paint a small area below the clavicle with tincture iodine, and, after boiling the needles, syringes and plungers, inject subcutaneously 1 c.c. of the anti-typhoid vaccine which equals a dose of 500,000,000 dead bacteria (250,000,000 typhoid and 250,000,000 paratyphoid). We use a 5 c.c. or 10-c.c. Record

syringe and have a number of needles, with a freshly boiled one for every inoculation. These are dropped into a basin with water heated over Bunsen flame or alcohol lamp. With an assistant painting on the iodine, we inoculate men, properly paraded, at the rate of from three to four hundred an hour, and as the men prefer to have this little ordeal over quickly they appreciate speed when properly done.

The second dose of the same strength is given from four to ten days later (usually one week), and the third dose of double the strength is given from four to ten days (usually one week) after that, making in all 2,000,000,000 dead bacteria. It is important to have the bottles containing the vaccine well shaken before using, also to have the rubber stoppers painted with iodine before inserting the needles through them for withdrawing the fluid. Our vaccine is prepared at the Ontario Provincial Laboratory.

The redness and tenderness surrounding the site of inoculation which sometimes supervenes begins to subside in a few hours. As the constitutional reaction comes on about six hours after the inoculation, consisting of malaise, headache, a slight rise of temperature and, in some cases, a tendency to faintness, light duties are advised for the men for twenty-four hours. When symptoms were severe enough the men were admitted to hospitals under the head of "inoculation fever." The usual time spent there has been from one to three days, with an occasional illness lasting five days or a week.

We have inoculated in District No. 2, between January 1, 1915, and January 1, 1917, 58,382 men three times each, making in all 175,146 inoculations. We have had no deaths from these and, while there have been a number of somewhat severe reactions, there have been admitted to hospital for this cause only 117 cases—less than one quarter of one per cent. of the men inoculated, or about one admission in every twelve hundred inoculations, a record which should remove any fears regarding, at least, any immediate danger from inoculation for those who

are in good health. Since that time our laboratory unit has given 16,546 additional inoculations with even better results and, where proper attention is paid to cleanliness and technique, the results should prove equally satisfactory elsewhere.

DISCUSSION.

DR. JOHN W. BRANNAN: I have not much to add if anything, but up to six months ago I have been inoculating all the nurses at Bellevue Hospital and the house staff until I got Dr. Norris to do it. I can't say what the number is, but think it is seven hundred. I found that the women bore the inoculations better than the men and practically none went to bed; whereas some of the men had a high fever after the first dose and were excused from the other dose. Some months ago in the only case in which I had trouble, in a doctor who came down with a severe attack which we thought would be fatal. Why it occurred we don't know. We have now two nurses at the hospital who came down with typhoid fever who were inoculated before they came into the hospital. Now it is required that all nurses be inoculated, and the graduate nurses have to bring a certificate to that effect. Two nurses were inoculated in the proper manner: that is, one cubic centimeter of the ordinary typhoid, giving them one million dead bacteria and then half the amount on the second inoculation.

DR. E. O. OTIS: I should like to ask the doctor how long he thinks the protection exists from the inoculation.

DR. C. E. EDSON: To answer Dr. Brannan's question: I had a group of engineers and their clerks and field men, some thirty in number, laying out an irrigation scheme in Colorado three years ago where the water was open to more than suspicion. It was in a territory in which there was a great deal of typhoid fever. They had their own camp, and the water supply was questionable, and as they went over the country the water they would get was also open to suspicion. Those thirty men were inoculated for typhoid fever and none of them came down with it though there was a great deal of typhoid in those counties that summer.

A friend of mine told me an interesting experience in any army cantonment, and I asked him about the typhoid, and he said they had only one case and he said that was a very peculiar case. The man was given his first injection and had an exceedingly violent reaction, more than anyone in the group, though some of them had been pretty severe. His case was studied, and the history was gone into carefully. The man came from Wyoming and he had exactly a

few weeks prior to the day he received his injection for typhoid prophylaxis, left home and had drunk water in a community in which there was more than an ordinary possibility of typhoid fever, and the case did develop into a true case of typhoid fever which, however, ran a mild course after the violent reaction, and it was a case of confusion. He had the reaction just before he left home. That is a case to be reported.

DR. GEO. D. PORTER: In regard to Dr. Otis' question as to the length of time of protection: it is considered over-seas that one year is the length of time of protection, and they reinoculate every year. In Ontario they are urging the men who are working on farms. A great many are going out on farms where sporadic cases occur, and they are urging them to be reinoculated. Our laboratory was going around the districts and testing all the wells. We were told that the wells were very clear, and yet every well was found to be infected. So you see the advantage of inoculating. I feel myself that inoculations will spread to civil practice in rural districts, but in cities we have a pure water supply.

I agree with the speaker about nurses. I have never seen a nurse faint, and the reactions are not very severe. It seems to be a mental affair. I have seen soldiers faint. It is largely due to their officers. If the officer talks about inoculations, the chaps will all come up afraid and faint, but I have never seen a nurse faint and never saw a patient faint after the inoculation. It is a simple procedure. We have done many in the morning, and the whole battalion comes in, and the harm of the inoculations is exaggerated.

Regarding the latent tuberculosis: personally I wouldn't like to give an inoculation to a tuberculous patient, because I think any reaction isn't good for a tuberculous patient. I think it is the same way with tuberculin, but in the army we are not supposed to have tuberculous patients and they have to take it, and its benefits are better than the harmful effects might be otherwise. It is a simple procedure, and cleanliness and quickness are essential to make a success of it.

Dr. C. D. Parfitt, Gravehurst, Canada, read a paper (from manuscript) on "Five Years' Experience with Artificial Pneumothorax."